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环渤海沿海区域耕地格局及影响因子分析

Analysis of spatial pattern of farmland and its impacting factors in coastal zone of Circum Bohai

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英文关键词：land use regression analysis rural areas coastal zone of Circum Bohai Sea Region farmland linear regression model spatial autoregressive model geographically weighted regression

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中文摘要：

为分析环渤海省市沿海区域耕地格局与影响因子的关系，以耕地在5 km×5 km网格单元所占比例为因变量，选用地形、距离、气候及人口等10个影响因子为自变量，别建立普通最小二乘法线性回归模型、空间滞后模型、空间误差模型、地理加权回归模型。结果表明：耕地格局及各影响因子均呈现较强的空间正相关，并随距离增大减少；针对该研究，空间滞后模型、空间误差模型和地理加权回归模型模拟效果均优于普通最小二乘法线性回归模型，空间误差模型优于空间滞后模型；从全局上来讲高程、坡度、到最近公路距离与耕地格局呈负相关影响，距最近海岸线、铁路、居民点距离、多年平均气温和多年平均降水与耕地格局呈正相关。从局部上来讲，除了年平均降水对各网格单元内耕地面积均呈正向影响外，其余影响因子随网格单元变化正负向影响均存在。多年平均气温和多年平均降水是主要的、最敏感的正向影响因子，高程、坡度和距最近水系距离为主要的、最敏感的负向影响因子。

英文摘要：

Abstract: In this paper, coastal zone of Circum Bohai Sea Region which covers an area of approximately 170, 000 km2 was selected as the study area. The spatial distribution characteristics of farmland of this study area were analyzed and the relationship between farmland distribution and natural, social or economic impacting factors was explored. Bas on Landsat TM images acquired in 2009/2010, farmland distribution map was created through visual interpretation with auxiliary data in ArcGIS 9.3. Then farmland distribution ma overlaid with a lattice map to statistic area of farmland in each 5 km × 5 km lattice. Impacting factors of farmland consisted of elevation, slope, distance to nearest coastline, distar nearest railway, distance to nearest road, distance to nearest residential area, distance to nearest river, average yearly precipitation, average yearly temperature and population de which were compiled into raster format data with a spatial resolution of 5 km × 5 km and normalized between 0 and 1 in ArcGIS 9.3. As conventional statistical methods assumed the data to be analyzed was statistically independent, it was inappropriate to use traditional statistical method to analyze spatial land use data which had a tendency to be depend In this study, ordinary least square linear regression model (OLS), spatial error model (SEM), spatial lag model (SLM) and geographically weighted regression model (GWR) were established from global and local perspectives. Several evaluation indexes were selected to assess the performance of those models. The results showed that: 1) Farmland was the land use type, which occupied 53% of the whole study area. Positive spatial autocorrelation that decreased gradually with distance was detected in both farmland distribution and impacting factors; 2) Spatial autoregressive models and GWR had a better goodness-of-fit than conventional linear regression model. As to spatial autoregressive models, SEM performed better than SLM in this study, as was indicated by higher preudo R2 value and maximum likelihood logarithm (LIK) value, and lower Akaike information criterion (AIC) Schwartz criterion (SC) value and residuals for the former model; 3) GWR could be used to explore spatial variation in the relations between cultivated land distribution and differe impacts factors, providing more detailed information, while SEM could only explore the relations from a global view; 4) The SEM showed a positive correlation between farmland elevation, slope, distance to the nearest roads, as well as a negative correlation between farmland and distance to nearest shoreline, distance to nearest railroad, distance to neare settlements, average yearly temperature, average yearly precipitation from a global perspective; and 5)The GWR revealed both positive and negative correlations between farmlan and impacting factors (expect for average yearly precipitation). Among the most sensitive factors affecting farmland distribution, average yearly temperature and average yearly precipitation were the main positive factors, while elevation, slope and distance to nearest residential area were the main negative factors.

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